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(3) The difference in spectral class between the components of double stars appears to be independent of their projected linear separation in astronomical units.

(4) From the meagre data available for the mass-ratio in a few binary systems (all dwarf stars), the difference in spectral class between the components shows a tendency to decrease as the ratio of the masses approaches unity.

FREDERICK C. LEONARD.

Lick Observatory, Mount Hamilton, Calif., July 2, 1921.

THE PHOTO-ELECTRIC PHOTOMETER OF THE LICK OBSERVATORY,
AND SOME PRELIMINARY RESULTS OBTAINED WITH IT*

(Abstract)

The photometer was built partly in the Observatory shop at Mount Hamilton and partly in the shop of the Physics Department at Berkeley. The lantern slides exhibit the instrument in detail. It differs from other photometers of this class in numerous details. The most conspicuous difference is in the manner of cutting down the light incident on the cell. When two objects are to be compared one must be reduced until both are of about the same brightness. Other observers have done this by means of objective diaphragms or shade glasses at the focus. In the present instrument it is done by a sector disk driven by a small motor.

Tests of the photometer were begun in the Physical Laboratory of the University of California and continued at the Lick Observatory. Much experimental work was necessary to put the instrument in good running order. The observing so far has included measures of the *Pleiades* to check the laboratory calibration; of stars of various spectral types to obtain the color-equation of the instrument; and of several variable stars.

EDITH E. CUMMINGS.

THE PHYSICAL MEMBERS OF THE PLEIADES GROUP*

(Abstract)

Two hundred and forty-four stars of the region of the *Pleiades* were found to have proper-motions differing less than $2''.0$ per century from the mean motion of the group, and they have to be considered as physical members of the group. Their spectral types and colors show a definite relation to their photographic magnitudes. Between the limits $2^m.8$ to 11^m the range in spectral classes

is from B₅ to G₅. For the fainter stars no spectral types have been determined, but the color indices indicate a further progress in spectral type to K₅ or M for the stars of 14th to 15th magnitude. The color indices of the classes Fo to G₅ are systematically smaller than those corresponding to these spectral classes on the average, a fact which seems to be a general characteristic of dwarf stars.

The luminosity law, established for the central part of the *Pleiades* over a range of 11 magnitudes, does not resemble a smooth error curve, but has a well defined minimum at 9th magnitude. As a consequence of the relation between magnitude and spectral type the luminosity law simply reflects the frequency law of spectral types. Just as for the whole sky on the average, the classes A₅ to F₅ are the least numerous among the *Pleiades* members, and therefore the luminosity law, too, has to show a minimum for the corresponding magnitudes. This minimum divides the *Pleiades* members into two classes: The stars of Secchi's first type, (B₅–F₅) of high luminosity, about 80 in number for the whole cluster; the stars of Secchi's second and third type (F₅–M), of small luminosity, for which the list is incomplete, but which must be at least three to five times as numerous.

A parallax value of 0".008 for the *Pleiades* was obtained from a comparison of the luminosities and spectral types of its members with corresponding data for the dwarf stars of known parallax. The orbital motions of ten double stars physically connected with the *Pleiades* give a hypothetical parallax of 0".010. The round parallax value of 0".010 should at present be the most reliable information on the distance of the *Pleiades*.

ROBERT TRUMPLER.

NOTE ON THE SPECTRA OF THE COMPANION TO POLARIS AND THE DOUBLE STAR Σ 2245

From spectrograms lately obtained with the 36-inch refractor and light 1-prism spectrograph of the Lick Observatory, the spectral class of the companion to *Polaris* ($= \Sigma$ 93, 2^m.1 and 8^m.8, p. a. = 216°, dist. = 18".2) has been determined as Fo. That of the principal star is F8. From Adams's spectroscopic parallax of *Polaris*, 0".010¹, its absolute magnitude and that of the companion are, on the assumption that the two stars are physically connected and therefore at the same distance, respectively – 2.9 and +3.8.

¹*Mt. Wilson Contrib.*, No. 199, 25, 1921.